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Exploring the sustainability challenges of long-distance passenger trends in Europe

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Abstract

This paper reviews current drivers of long-distance passenger transport demand in Europe, and elaborates about their environmental impacts and the suitability of current EU policies to address them. The paper focuses on car and air travel, as they concentrate the bulk of environmental impacts, at least in terms of GHG emissions. Furthermore, car travel keeps the highest share of total travel, and air travel is the fastest growing mode in Europe, justifying a closer look to both modes. The prospects of a peaking or "plateau" value for long-distance car travel are discussed, concluding that there is robust evidence of peaking in many European countries, although at unacceptable high levels from a sustainability perspective. In the case of air travel, the main sustainability challenge is the sustained growth in demand, spurred by the strategy of many airports and airlines to induce further demand with low fares. Both trends would need action from governments. The need for action is further justified by two socioeconomic trends: population, with growth concentrated precisely in those countries with higher long-distance mobility patterns, and disposable income, with median values stagnated for many years. The former would suggest a need for demand management action focusing on those countries with higher demand; the latter would challenge the traditional understanding, which associates long-distance transport demand to increasing income and to economic prosperity.

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1. Introduction

From an environmental perspective, two main reasons can be highlighted to analyse the relevance of long-distance transport. The first one refers to the local impact of transport activities in the vicinity of busy transport infrastructure, such as main terminals (airports and rail stations) or rail and motorway sections. The second one is related to the greenhouse gas (GHG) emissions of long-distance travel. Whereas the former requires detailed information about the physical and socioeconomic characteristics of the surroundings of major long-distance transport infrastructure, the latter can be associated roughly to available statistics on total traffic volumes. Any evidence of reaching a peak or "plateau" in travel demand in industrialised countries would probably justify a substantial revision of current mitigation strategies, as stated in the European Union's (EU) roadmap towards a low-carbon economy (EC, 2011a) and in the Transport White Paper (EC, 2011b), making it feasible to undertake more ambitious reduction targets, and also putting mobility behaviour and lifestyles at the front of the scene for future policy action.

Car and air travel are the key contributors to GHG emissions from transport. It is well known that car trips remain the bulk of intra-EU passenger transport, even if only long-distance trips are considered. As a reference, these trips constitute 29% of total passenger-km travelled, in accordance with the estimate of Dargay & Clark (2010) for the UK. Whereas car transport figures have remained stable since 2004, intra-EU air transport was severely affected by the economic crisis since 2008, and has stabilized now at pre-crisis levels, becoming the second mode of choice after car travel; it is worth noticing that this mode has by far the highest specific emissions (g CO₂ per passenger-km travelled, PKT) compared to any other mode. In spite of high-speed expansion and liberalization of bus services in some countries, both modes keep a lower share of total long-distance transport, and at any rate their impacts in terms of GHG emissions remain low.

Justifications about a possible reduction of travel growth in industrialised countries include increasing socio-economic uncertainty, and new lifestyles. One of the aspects that have received more attention, related to lifestyles, refers to the expanded use of information and communication technologies (ICT). ICTs can be considered not only as a source providing activities that makes travel less attractive, but as a new accessibility tool on its own, which would constitute a virtual, new "transport mode" (van Wee, 2015). However, the validity of arguments sustaining that ICT can act in both directions, either inducing further demand or replacing trips, has not been challenged by the evidence collected yet (Mokhtarian, 2009).

The purpose of this paper is to explore the prospects in long-distance transport demand by car and plane, and their consequences for the EU's objective to reduce GHG emissions. As stated in the Transport White Paper, the European policy explicitly disregards any active demand management actions (EC, 2011b, §18) and, although positive, a stabilisation of long-distance travel demand at the currently high levels could be incompatible with substantial GHG reductions. There are four main research questions to explore: first, whether total demand for long-distance trips by car and plane is expected to keep growing in the future, in accordance with the population and income trends. Second, whether the evidence for a peaking in per capita long-distance travel by car is consistent enough, and if so whether this would be enough to curb GHG emissions. Third, whether air travel growth is due to the traditional socioeconomic drivers (population and income growth) or rather by supply-side strategies. Four, whether changes in lifestyles and technological developments are playing a significant role today or could do so in the near future.

The paper will make use of transport statistics compiled by Eurostat, and the indicators based on these statistics, as presented in the European Commission's statistical pocketbook (EC, 2015) and the EEA TERM report (EEA, 2014). Information will be analysed at the EU and national level and, for air transport, also at the regional (NUTS2) level. These sources include performance (PKT) figures for car travel, although without any split by distance, and passenger figures for air travel. The paper is organized as follows. Section 2 analyses the trends in air and car passenger transport in the EU; section 3 discusses the potential changes in key transport demand drivers suggested by the previous analysis; section 4 discusses the policy implications summarizes the paper's findings and conclusions.

2. Emerging trends in long-distance car and air travel

2.1. Is long-distance travel by car peaking?

Car travel statistics do not include a distribution of PKT by distance range. However, this information is available in those countries conducting National Travel Surveys. Dargay & Clark (2010) described long-distance travel patterns in Great Britain, and analysed their main drivers, using data from the 1995-2006 National Travel Surveys (NTS). The average annual long distance (80 km or more, one way) travel per capita was 2,662 km for car and 3,402 km in total: this would represent 29% of total car km travelled and 31% of all km travelled. They concluded that long distance travel was strongly related to income: air travel would be the most income-elastic, followed by rail, car and finally coach. Furthermore, income would be an important factor in determining the total quantity of long distance travel.

Nicolas & David (2009) described long-distance travel patterns in France. Calculations were based on the 1994 NTS. Long trips (all modes) represented 40% of total distance, or 5350 km per year and person. Of them, 52% by car, 29% by air and 11% by rail. Long distance travel accounted for 40% of CO₂ emissions in 1994. As long-distance mobility had increased the most at that time, and income level was found as the main explanatory variable for demand, the authors made the case for a rise in prices, as a way to contain GHG emissions. In their views, this would only have a moderate negative impact on equity, as long-distance travel concerns fewer compulsory trips and mainly affects the wealthier members of the population.

Grimal (2010) provided a review of the 2008 French NTS. Cars accounted for 40% of the total distance travelled, and average annual growth between the former (1994) NTS and the 2008 NTS was clearly higher for rail and air (3,0 % and 2,5 %) than for car (1,4 %).

Kuhnimhof, Georg, Madre, & Collet (2009) made a general description of long distance travel in Europe, based on NTS from a few countries, results from the EU-wide DATELINE survey on long distance travel (data collected in 2001-2002), and some modelling exercises. They concluded that long-distance travel demand was higher in central and northern European countries than in the south. About two thirds of all long distance travel was covered by car. The number of annual trips varied significantly among countries, particularly for medium-distance (100-400 km) trips: from 7.3 trips per year (Sweden) to 5.5 (United Kingdom), 5.1 (Germany) or 4.5 (France). The range of variability was narrower for trips over 400 km: from 1.4 trips per year (Sweden) to 1.0 (Germany), 0.9 (United Kingdom and France), and 0.6 (Spain).

Petersen et al. (2009) estimated a significantly higher volume of long-distance travel in Europe, compared to the estimates for UK and France mentioned above. Trips beyond 100 km would account for about 55 % of the total passenger-km. This is consistent with the estimates made by the International Transport Forum with the MoMo model of the International Energy Agency: some 9,500 km per year and inhabitant for trips longer than 100 km in OECD countries (Cuenot, Fulton, & Staub, 2012; EEA, 2014; OECD/ITF, 2013).

The drivers of long-distance car travel are mainly related to holidays, friends and family: private purposes account for 80% of total trips, compared to 20% of business travel, in accordance with the French 2008 NTS (Grimal, 2010). This percentage is probably not homogeneous among countries: in accordance with the EUROSTAT's "tour-dem" database, and referring only to trips in 2012 including one or more nights, the percentage would vary from less than 5% for countries such as the Netherlands, and Greece to 10% for countries such as France and Spain, and to values close to or beyond 20% for Germany, Belgium or Poland.

Decisions on long-distance travel would be influenced by the characteristics of the final destination and travel time (Limtanakool, Dijst, & Schwanen, 2006), besides the socio-economic characteristics of the travelers. An interesting by-side consideration on the drivers of long-distance travel is the influence of secondary home ownership. Trips with secondary homes as the destination accounted for 10 % of long-distance trips in EU-28 in 2012, but this share is much higher in most southern European countries (36 % in Greece, 28 % in Spain and 19 % in Portugal) and in some EU-13 Member States (28 % in the Czech Republic and 19 % in Slovenia) (EEA, 2014).

The indicator chosen to search for evidence on peak-car travel is the average annual distance travelled by citizens in each European country. This was the approach of Millard-Ball & Schipper (2010), followed afterwards by many other researchers. Fig. 1 summarizes the peak car travel situation in Europe. The value and year of peak travel is indicated in yellow for each country, and those countries which have no peaked yet, or have reached a peak value

after 2010 are indicated in red. The latter group includes a few countries with extremely low growth (below 0.5% in total) since 2010 (Slovakia) or 2011 (Austria, Germany, Finland and Malta), as well as Eastern European countries with still fast travel growth and no signals of peaking anytime soon. In most cases, decrease in annual car travel distance since the peak year until 2013 has been modest, below 5%, but in some cases it has been significant: 20% in Italy, 13% in Spain and 12% in United Kingdom.

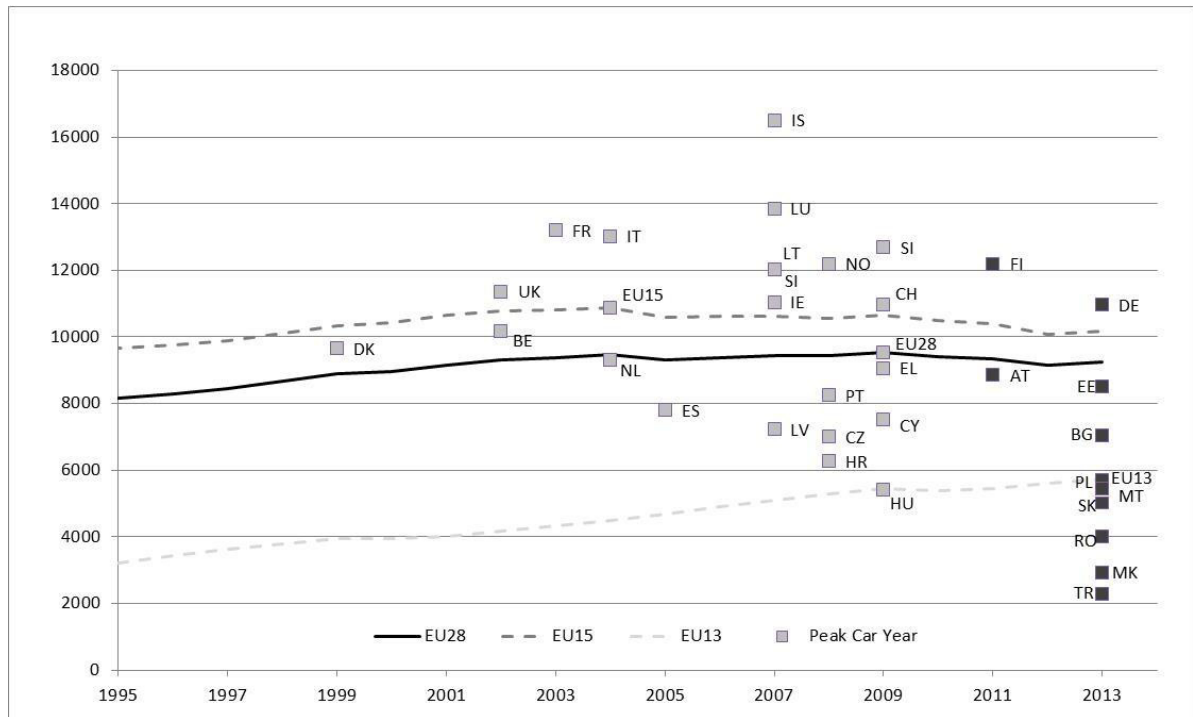


Fig. 1. Annual passenger-km per capita (Source: Eurostat).

There are difficulties to discern whether peak-car is associated to short or long-distance travel, or to both. The peak values obtained differ enormously from country to country, reflecting not only socio-economic and geographic diversity, but also differences in statistical collection methods. However, it can be concluded that a good number of European countries have reached peak-car well before the economic downturn, and that peaking in total car travel performance would have been unlikely if relying solely on a reduction of car trips in urban areas. Current trends would suggest that annual distance travelled would be "plateoning" rather than "peaking", without any evidence to further decrease in the future.

2.2. Is induced travel the main driver of air transport demand growth?

Allroggen, Malina, & Lenz (2013) analysed the impact on air traffic growth of the incentives offered by many airports. Airport charges contribute significantly to differences in operational costs among airlines (IATA, 2006), and airport management may use charges as a means of attracting traffic. Many studies indicate that incentives for route and traffic development are widespread in Europe and in the United States (Fichert & Klopheus, 2011; Jones, Budd, & Pitfield, 2013; Malina, Albers, & Kroll, 2012). Allroggen, et al. (2013) analysed a sample of 194 European airports, finding that incentives are a part of the charges-setting strategy of airports. Guidelines on state aid to airports and airlines were issued by the European Commission recently, although their short-term influence in current practices to attract new low-cost flights will be, at best, limited (EC, 2014; EEA, 2014).

Regional airports and their subsidies to operators could therefore constitute a major driver of air travel growth, as illustrated by the analysis of Barbot (2006) for the case of Ryanair in Charleroi (Belgium). As Mancuso (2013) states, airport and air traffic fees are usually intended to cover infrastructure costs in full, but airlines may be offered a range of incentives for operating at certain airports or serving certain destinations, and some airports may receive state aid from public authorities for new investments or to support operations.

Martinez-Garcia, Ferrer-Rosell, & Coenders (2012) described the profile of low-cost users, comparing business and leisure travelers. Their conclusion is that low fares are a major attribute for decision in both cases, more relevant than the differences among both groups of users (linked to traits such as quality of flight, proximity to final destination, frequency...). This would suggest that low cost carriers (LCC) have still significant room for further expanding their market share at the cost of legacy airlines.

Clewlöw, Sussman, & Balakrishnan (2014) reviewed the strategies of low-cost carriers (and HSR operators) to attract new travelers. They analyzed European air passenger traffic between 1995 and 2009, based on data from over 35 airports and 90 airport pairs, to find that low-cost carriers had a significant influence in increasing air travel, mainly through medium-haul, intra-EU flights, and resulting in a significant net gain in the total passenger-kilometers travelled in Western Europe. There were significantly more medium-haul flights added to the system than short-haul flights removed, which is consistent with trends showing decline in domestic flights and growth in other intra-EU flights.

The expansion of low-cost companies (LCC) has resulted in a sustained decrease in air fares since the early 1990s. Based on the information provided by the Association of European Airlines (AEA), Burghouwt & de Witt (2015) concluded that the average real passenger yield of AEA companies had fell from USD 0.21 in 1991 to USD 0.09 in 2012. The passenger yield is a proxy of air fares, as it provides the average income airlines get per passenger-km; real values provide correction from inflation and currency exchange rates.

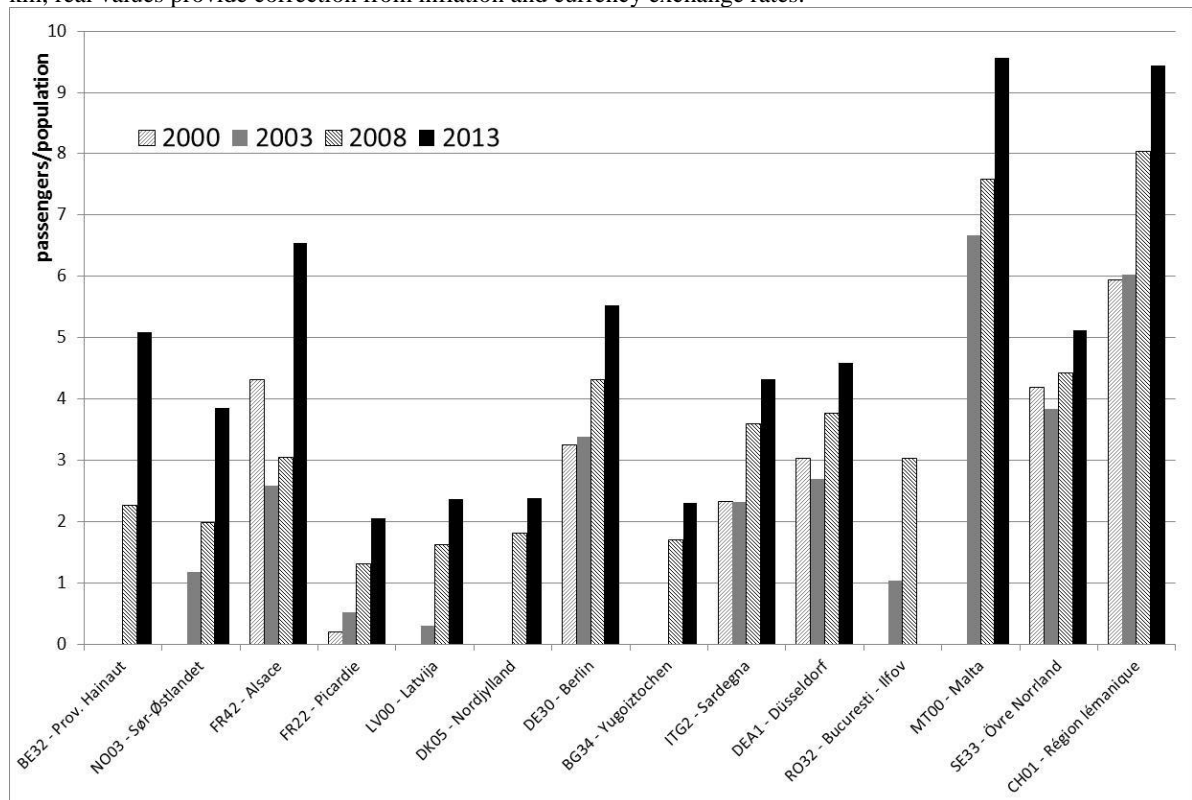


Fig. 2. Airports with 2007-2012 growth over 19% and significant traffic.

The number of passengers per inhabitant in one region (NUTS-2 level) can provide a useful proxy to identify airports with traffic volumes disproportionate compared to the population immediately served. High values could be expected in popular tourism destinations, regions hosting major global air hubs and in regional airports being particularly successful in attracting low cost services as an alternative to traditional airports.

Fig. 2 provides an overview of the growth trends in airports with an indicator value above 2 passengers per inhabitant, and with growth above 19% between 2007 and 2012. The conclusion is that there are many regional airports rapidly expanding, and that only a few "traditional" airports are growing (Vienna, Zurich, Oslo). Airports leading growth in Europe would include airports in eastern European capitals, traditional airports with an aggressive low-cost policy, emerging regional airports, with a strong low-cost component and some regional hubs that may be benefiting from growth in their area of influence.

EU-12 and EU-15 are following different patterns in air travel growth, with intense growth in the former and moderate growth in the latter. It is worth noticing that there are further differences among countries within EU-15 with Nordic countries growing faster than southern countries. The main growth in passengers is associated to travel outside the EU, whereas domestic travel is declining and intra-EU travel is growing at a much slower pace, at least since 2007. These trends are also consistent with changes in the split of passengers according to destinations in the EU: passengers in national flights account for 13% of the total, and are losing share; the share of intra-EU passengers is stabilised at 59% of the total, and passengers with origins or destinations outside the EU account for 28% of the total, and are increasing their share.

EUROCONTROL (2014) reviewed trends in the various market segments in Europe, concluding that the EU air market was achieving maturity, so that only limited further growth could be expected for intra-EU travel, and also moderate growth for extra-EU trips. Previous forecasts had been much more confident about further air travel growth: Alonso et al. (2014) reviewed the distribution of air demand in EU countries, forecasting further growth, coupled to economic development (GDP). In the EU, the distance segment between 500 and 1000 km has more flights and passengers than larger distances. Under the scenario defined by EUROCONTROL (2014) as pessimistic, traffic would grow again after 2016 and at least until 2030 at a healthy 1.0-2.0% for intra-EU and 2.0%-2.5% for extra-EU (pessimistic scenario). The analysis of passenger flights showed that most of the traffic is related to distances below 1000 km, with almost 60% of the flights and 46% of the passengers, despite the broad availability of surface transport alternatives.

There are powerful drivers to keep long-distance travel growing, and even if the number of passengers stagnates, there are good arguments to sustain that the distances travelled will keep growing, with trips outside the EU replacing current domestic and intra-EU trips, mainly in the leisure segment (EUROCONTROL, 2014). These growth trends are mainly sustained on induced trips, pushing rather than following demand. From this perspective, there is a case to consider a revision of current regulation, on environmental grounds, to curb future demand growth. Lacking clear signals to do otherwise, air carriers in Europe would probably have no choice but to further induce demand in order to preserve their profitability.

3. Any changes in the key drivers of long-distance travel?

Long-distance travel is traditionally considered as a desirable activity, both in the leisure and travel segments. Population and income- or more generally economic growth- on the one side and on the other side technological progress providing cheaper, faster and more convenient services would be at the basis of historical trends towards longer annual distances travelled by citizens.

A justification of any substantial deviation from this "ever-growing" paradigm can be searched through a revision of recent trends in some of these drivers, and particularly in population and income. Certainly, this review should be expanded in the future, in order to analyze to what extent lifestyles are also moving away from the traditional view of long-distance transport as a desirable activity and to clarify whether some technological developments, such as automatic driving, could have an impact, reviving people's interest in long-distance trips by car.

Population trends in Europe have traditionally been considered as favourable to further transport demand growth, in total and on a per capita basis, on the ground of the expected absolute population growth, and the increasing travel patterns in those categories showing higher growth in the population pyramid, such as the elderly (e.g. Petersen, et al., 2009; Sessa & Ennei, 2010).

Fig. 3 shows annual changes in population in Europe. The general trend for moderate growth as a whole hides a much complex variety of situations, with sustained decline in EU-12, sharp dependency on the economic cycle in the south and steady growth in the north, precisely where long-distance transport demand is higher.

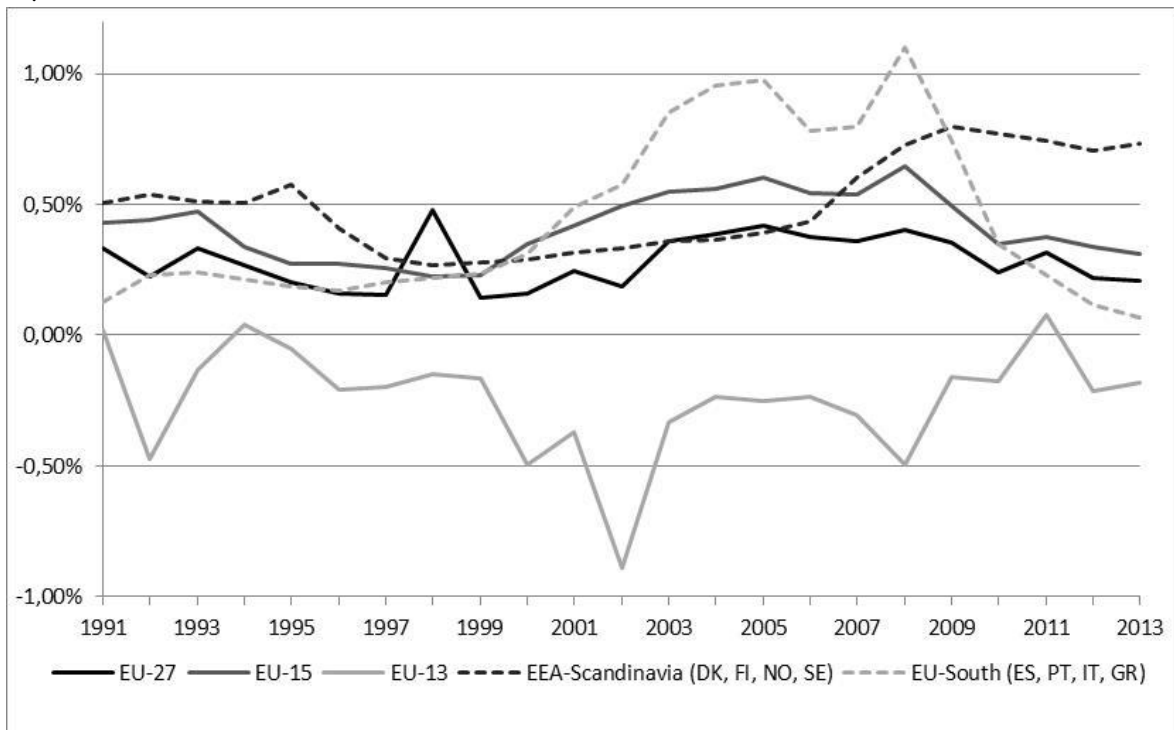


Fig. 3. Annual changes in population in Europe. (Source: EUROSTAT, EEA, 2014).

The relevance of economic growth to shape future long-distance transport demand is also uncertain. Fig. 4 summarises median income for different groups of European countries. With the exception of Scandinavian countries, it could be concluded that disposable income has not varied significantly in the last decade in Europe, and could not have much influence in long-distance travel demand. Prospects on future trends in disposable income are the object of much debate in Europe in these times, due to increasing disparities and no significant gains in income for the population in the lower quintiles. As the medium and lower quintiles are those with higher potential to increase their long-distance travel demand, it could be concluded that income trends would not have played a relevant role in the last years, and there would not be much prospect for a change in the near future, unless income distributional policies in Europe move dramatically from the current paradigm.

A third driver of long-distance transport demand refers to lifestyles. There are still no clear signals about the impact of ICTs on transport demand, particularly for long-distance travel. The evidence available merely states that new options are available now, and are consolidating their attractiveness among Europeans, particularly the young generation, offering travel-free alternatives to conduct leisure and business activities. As competing options, they could result in some reduction in travel demand. The possibility that they could serve as a means to induce further travel cannot be totally dismissed, but it seems to be rather small. ICTs have also facilitated informal travel, through ICT-based car sharing platforms for long-distance trips. Salomon & Singer (2014) examined informal travel and the role of ICTs in its expansion, based on the 2009 US National Household Travel Survey. They found some evidence that informal travel could be increasing, propelled by growing use of information and communication technologies. Unfortunately, statistics in European countries cannot provide evidence for that; informal travel should result in an

increase in average car occupancy in long-distance trips, but this parameter is not surveyed often enough in most European countries.

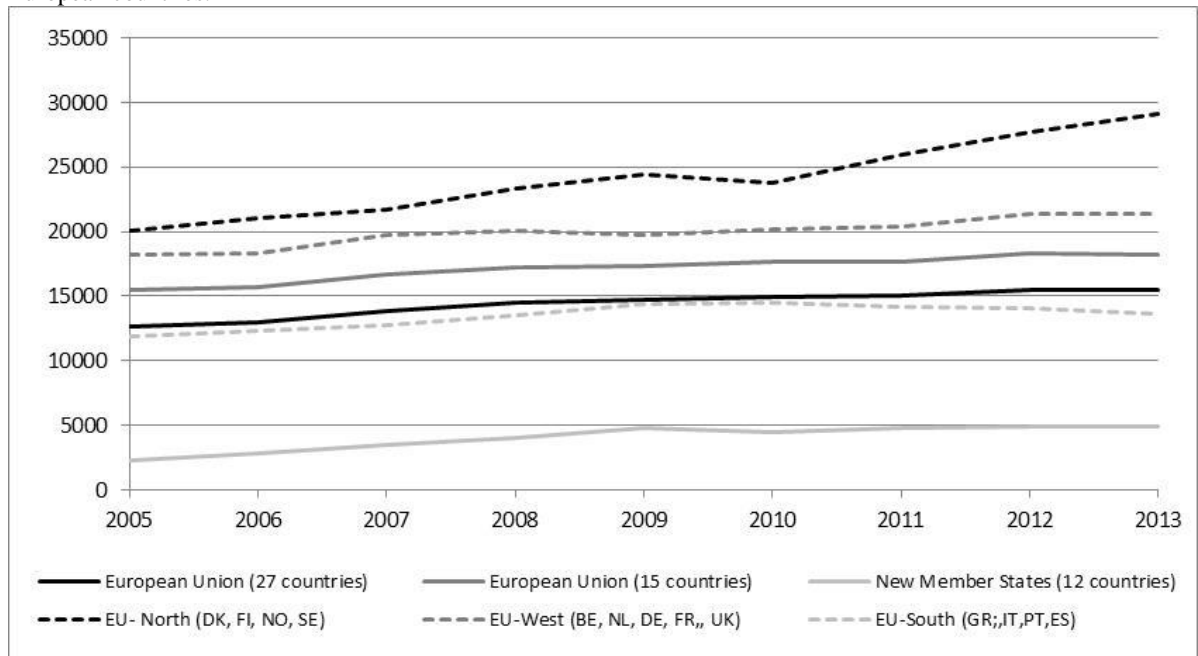


Fig. 4. Median income in Europe (EUR per year). (Source: Eurostat).

In the absence of clear signals for significant travel growth from the demand side, supply would become the basic driver to induce further long-distance mobility. Future demand growth would be relying on the ability of suppliers to keep their product desirable and affordable to a growing number of users, in order to induce further demand. This has been the approach followed by key stakeholders for two decades in the air (decreasing fares by most airlines and some airports) and car (falling purchase and maintenance costs and decreasing fuel taxes) sectors, but the sustainability of this strategy in the future is, at best, uncertain.

The transport data available cannot provide definite answers about the peak travel issue, but it makes it possible to sustain that significant changes could be happening in passenger demand, and that future trends would be primarily influenced by strategies from the supply side rather than by the traditional socio-economic drivers of travel. For car use, the growing influence of ICTs is already now generating some response from the car industry: from automatic driving to integration of ICT-related services within car features, there is an array of attempts for shaping the car experience to the new profile of users. For air travel, the race to low prices does not seem to have reached the bottom, and low-cost strategies for middle-range destinations could be transferred now to the long-range segment (Burghouwt & de Witt, 2015).

Regulators would be facing a major challenge under this new scenario. In the past, deregulation and lack of action to curb demand were justified on the grounds of not interfering with the needs of economic growth. In future, transport demand expansion would be less a consequence of economic growth and populations' choices than the narrow objective of an industry desperately fighting to increase its market. There are many reasons justifying a change in policy from the government side: from the attainment of GHG emission reductions to the desirability of dedicating scarce economic resources to more productive activities than inducing further travel.

Nevertheless, it must be reckoned that some other trends could change this picture. Migration trends is a major source of uncertainty, and a possible source of future long-distance travel demand growth, should this increasing part of the future European population keeps strong familiar and economic ties with their regions of origin.

4. Conclusions: the scope for policy action

This paper attempted to contribute to the discussion on four main research questions: first, whether total demand for long-distance trips by car and plane is expected to keep growing in the future, in accordance with the population and income trends. Second, whether the evidence for a peaking in per capita long-distance travel by car is consistent enough, and if so whether this would be enough to curb GHG emissions. Third, whether air travel growth is due to the traditional socioeconomic drivers (population and income growth) or rather by supply-side strategies. Four, whether changes in lifestyles and technological developments are playing a significant role today or could do so in the near future.

To the first question, it would be fair to answer that the prospects for further growth in long-distance travel are not as clear as they were in the past. There are some signs of a change in the traditional trends of long-distance travel, so that growth could be less robust in the future, and even come to a halt. These signs include the peaking of car travel in many countries (although at quite high values), the more uncertain prospects for further air travel growth, after two decades of aggressive policies to induce demand, and the modest perspectives in population and income growth. However, there are also indications that population growth would be expected in the future precisely in those countries with higher long-distance travel demand patterns, with a disproportionate impact in terms of GHG emissions.

The evidence for a peak in car travel is robust, but even under a scenario of "peak travel" in annual per capita figures, total long-distance passenger demand may keep growing, following the expected population trends. It seems that population could keep growing substantially in northern Europe and, if the economic climate improves, in southern Europe. This can be coupled with further global migration flows. Therefore, peak travel could hardly be considered as a justification to weaken current EU efforts to decrease GHG emissions. Furthermore, peak car travel is materialising in many European countries, mostly "old" EU members, but there are others still far away from those peak-car levels, and substantial further demand growth could also be expected from them. This is a significant source for future mobility (and emissions) growth in Europe as a whole, and a reason to question whether peak travel must necessarily be achieved at then current high levels, without making efforts to reduce them. Thus far, there have been no signs of significant reduction in mobility levels once peak car travel has been achieved, and this would mean that car use would remain at unacceptable high levels.

Air travel keeps growing at a significantly high rate, particularly for trips outside the EU. In the absence of growth in disposable income, the growth in air travel can be primarily associated to the availability of low fares. Although current airlines' practices have resulted in some social benefits, such as a widened availability and choice of low-cost destinations for business and leisure to a growing part of the population, the induced demand has had negative environmental impacts, particularly in terms of GHG emissions. There is a case to further reflect on the medium and long-term sustainability of current air travel trends and practices. Better regulation (as intended, for example, for public aid to regional airports) could facilitate the sector to move away from current strategies to stimulate demand, and align prices with the full costs of air travel. Although the recent failure of the ETS scheme in aviation is certainly a discouraging sign, there is a need for exploring alternative ways to manage the current "race to the bottom" in air travel competition.

As for the prospects of new lifestyles and technological developments, it should be said that they have not materialized yet, and that they remain more as a promise or as a hope than as a certainty. It seems unlikely that, in the absence of bolder demand-management policies from governments these changes will be quick and deep enough to substantially curb current demand levels and their associated GHG emissions. Action of governments is further justified on the basis of past and present strategies of transport operators and other stakeholders to further boost induced demand.

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